

## CLAIMS

What is claimed:

1. A system for transmitting an OFDM signal via a channel to facilitate receiver synchronization comprising:

a transforming stage that transforms a first series of N frequency domain symbols into a first burst of N time domain symbols and that transforms a second series of M frequency domain data symbols into a second burst of M time domain symbols;

a cyclic prefix appending stage that appends to a beginning of said first time domain burst a first cyclic prefix duplicating a last segment of said first time domain burst to form a first synchronization burst, and that appends to a beginning of said second time domain burst a second cyclic prefix duplicating a last segment of said second time domain burst to form a second synchronization burst, said first and second cyclic prefixes including a first portion having length  $v$  wherein  $v$  is greater than or equal to a duration of an impulse response of said channel; and further including a second portion after said first portion to facilitate receiver synchronization; and

wherein said first and second synchronization bursts are transmitted concatenated together.

2. The system of claim 1 wherein N equals M.
3. The system of claim 1 wherein N does not equal M.

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4. The system of claim 1 wherein said first and second synchronization bursts are transmitted within the same duration that would be reserved for transmission of a single OFDM burst that does not facilitate receiver synchronization but carries data.

5. The system of claim 1 wherein some of the N frequency domain symbols carry data.

6. The system of claim 1 wherein some of the N frequency domain symbols carry training information.

7. The system of claim 1 wherein some of the M frequency domain symbols carry data.

8. The system of claim 1 wherein some of the M frequency domain symbols carry training information.

9. The system of claim 4 wherein one or more further synchronization bursts are transmitted within said duration.

10. A system for synchronizing to a received time domain signal comprising:

a receiver system that receives one or more synchronization bursts of symbols, each of said synchronization bursts including at least two time domain synchronization sub-bursts, a first of said sub-bursts including N time domain symbols preceded by a first cyclic prefix, a second of said sub-bursts including M time domain symbols preceded by a second cyclic prefix, said first and second cyclic prefixes including a first portion having length  $v$  wherein  $v$  is greater than or equal to a duration of an impulse response of said channel; and further including a second portion after said first portion to facilitate receiver synchronization, wherein said receiver system receives further time domain bursts of symbols; and

a synchronization block that determines burst timing alignment responsive to optimization of a cost function determined responsive to said contents of said one or more synchronization bursts.

11. The system of claim 10 wherein  $N$  equals  $M$ .
12. The system of claim 10 wherein  $N$  does not equal  $M$ .
13. The system of claim 10 wherein said first and second time domain synchronization sub-bursts are received within the time period reserved for reception of a single OFDM burst that does not facilitate receiver synchronization but carries data.
14. The system of claim 10 wherein some of the  $N$  frequency domain symbols carry data.
15. The system of claim 10 wherein some of the  $N$  frequency domain symbols carry training information.
16. The system of claim 10 wherein some of the  $M$  frequency domain symbols carry data.
17. The system of claim 10 wherein some of the  $M$  frequency domain symbols carry training information.
- ~~14~~  
~~18.~~ The system of claim 13 wherein one or more further synchronization time domain sub-bursts are received within said time period.
- ~~15~~  
~~19.~~ The system of claim 10 wherein said cost function evaluates degree of match between said

second portion of said first cyclic prefix and a corresponding portion of said N time domain symbols and between said second portion of said second cyclic prefix and a corresponding portion of said M time domain symbols.

20. In a digital communication system that communicates bursts of symbols, a method for synchronizing a receiver to burst timing of a transmitter comprising:

receiving one or more synchronization bursts of symbols, each said synchronization bursts including at least two time domain synchronization sub-bursts, a first of said sub-bursts including N time domain symbols preceded by a first cyclic prefix, a second of said sub-bursts including M time domain symbols preceded by a second cyclic prefix, said first and second cyclic prefixes including a first portion having length  $\nu$  wherein  $\nu$  is greater than or equal to a duration of an impulse response of said channel; and further including a second portion after said first portion to facilitate receiver synchronization, wherein said receiver system receives further time domain bursts of symbols; and

determining burst timing alignment responsive to optimization of a cost function determined responsive to said contents of said one or more synchronization bursts.